FIG. 1

FIG. 2

RECEIVE SEQUENCE OF DATA BITS — 42

SEQUENTIALLY PRECODE RECEIVED DATA BITS — 44

MAP PRECODED BITS INTO SEQUENCE OF SYMBOLS P_n — 46

DIGITALLY PROCESS THE SYMBOLS P_n OF THE SEQUENCE TO PRODUCE SYMBOLS Q_n THAT SUM THE LAST (K+1) SYMBOLS P_n — 48

MODULATE AMPLITUDE OF CARRIER WAVE BASED ON VALUE OF Q_n IN THE DATA INTERVAL AT WHICH MODULATION IS PERFORMED — 50

TRANSMIT THE MODULATED CARRIER WAVE TO COMMUNICATION CHANNEL — 52
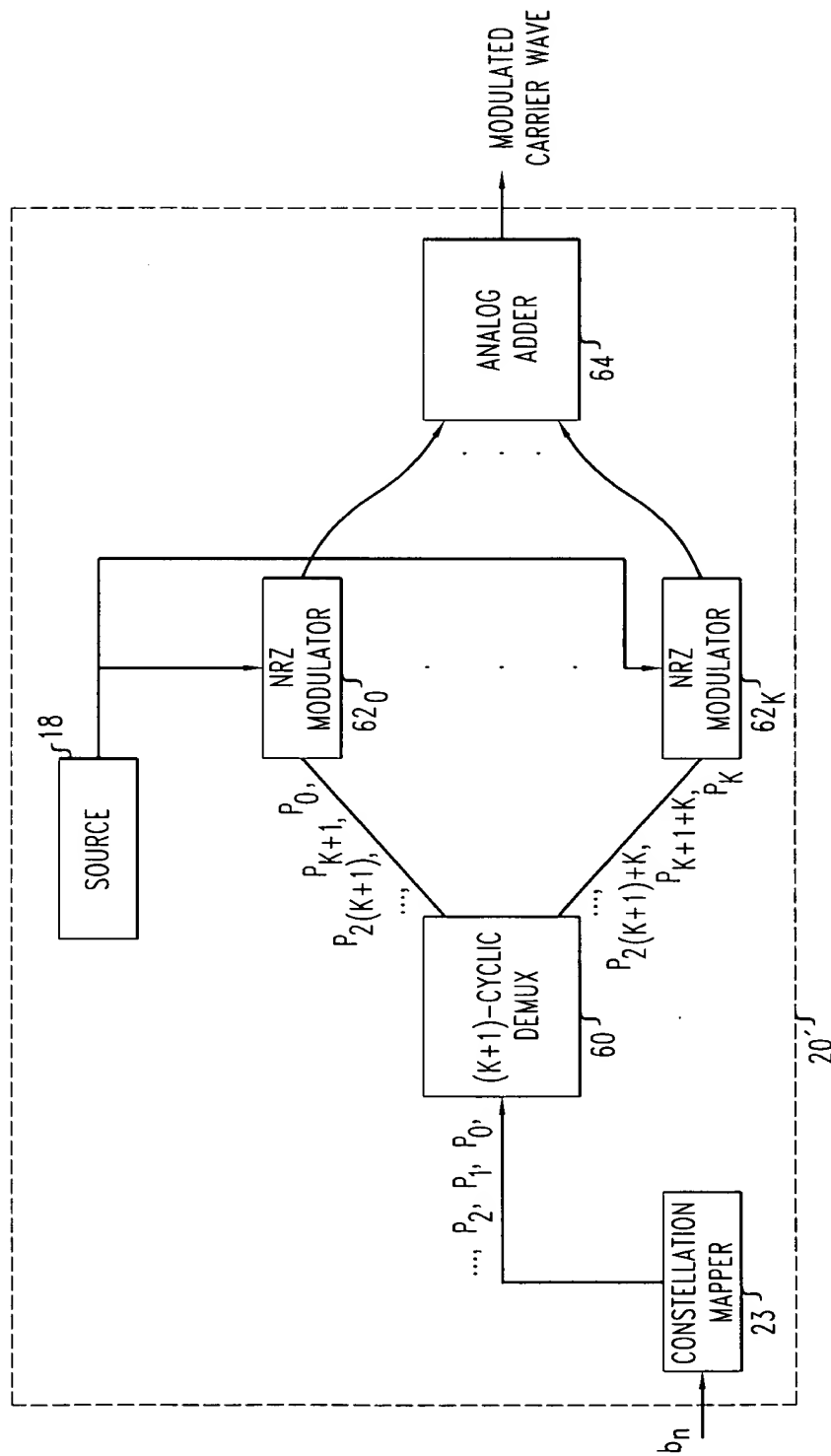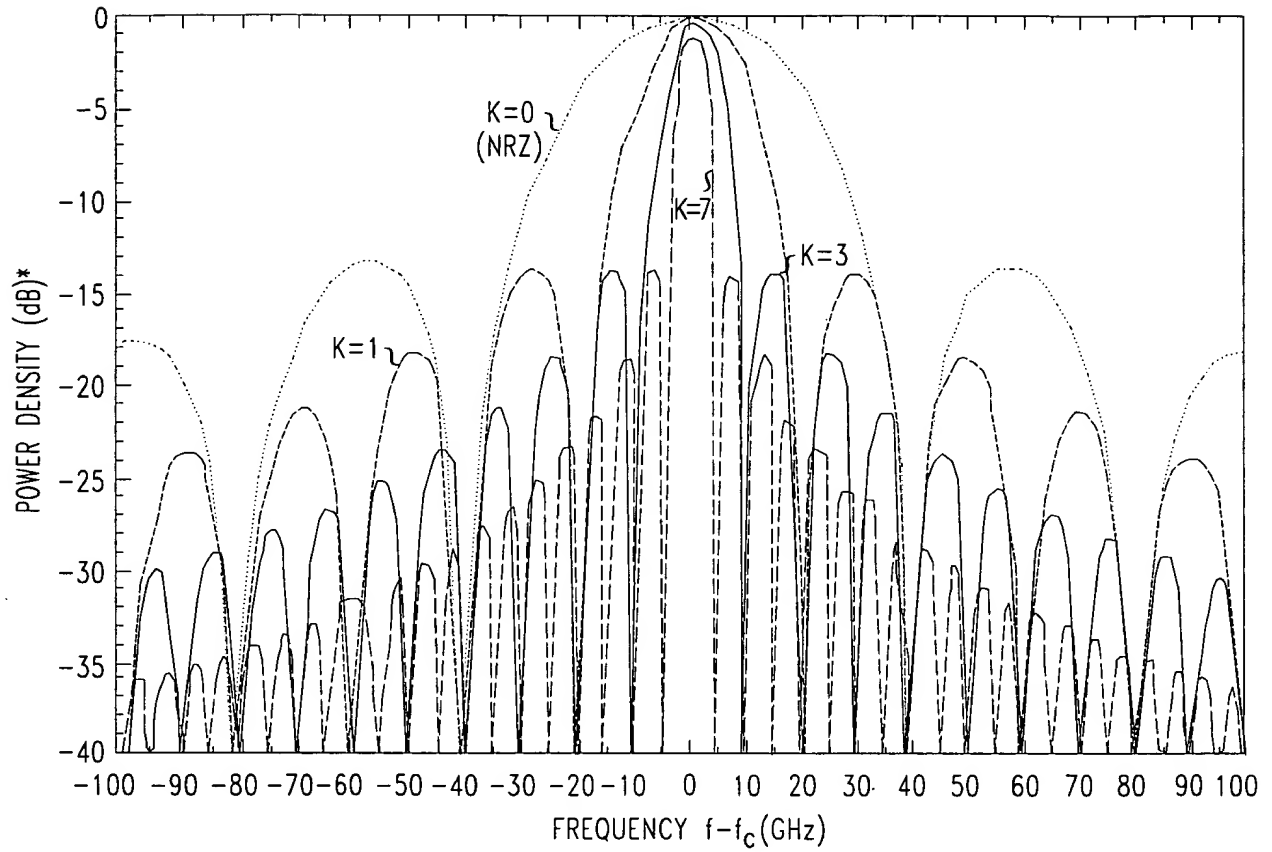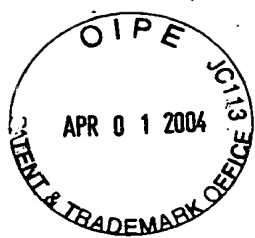
40

FIG. 3

FIG. 4

Legend:

- ⋯⋯⋯⋯ NRZ
- ‐‐‐‐‐‐ $1+Z^{-1}$ (DOUBINARY)
- ——— $1+Z^{-1}+Z^{-2}+Z^{-3}$
- ‐ ‐ ‐ ‐ $1+\sum_{i=1}^{7} Z^{-i}$

* RELATIVE TO THE DENSITY AT $f=f_c$

FIG. 5

FILTER RECEIVED SIGNAL TO SELECT A CARRIER WAVE ⌐ 72

⌐ 70

MEASURE INTENSITY OF CARRIER WAVE ⌐ 74

ESTIMATE VALUE OF TRANSMITTED INTENSITY DURING A DATA
PERIOD FROM THE MEASURED ENERGY ⌐ 76

MAP ESTIMATED VALUE OF TRANSMITTED INTENSITY TO AN ESTIMATED
VALUE OF THE INPUT DATA BIT BASED ON A CONSTELLATION IN
WHICH MULTIPLE INTENSITY VALUES CORRESPOND TO ONE VALUE
OF A TRANSMITTED DATA BIT ⌐ 78

FIG. 6

FIG. 7

FILTER RECEIVED SIGNAL TO SELECT A CARRIER WAVE $\quad$ 72 $\quad$ 70'

MEASURE AMPLITUDE AND SIGN OF CARRIER WAVE $\quad$ 74'

ESTIMATE Q_n FOR ORIGINAL CARRIER WAVE DURING SIGNALING INTERVAL FROM THE MEASURED AMPLITUDE AND SIGN $\quad$ 76'

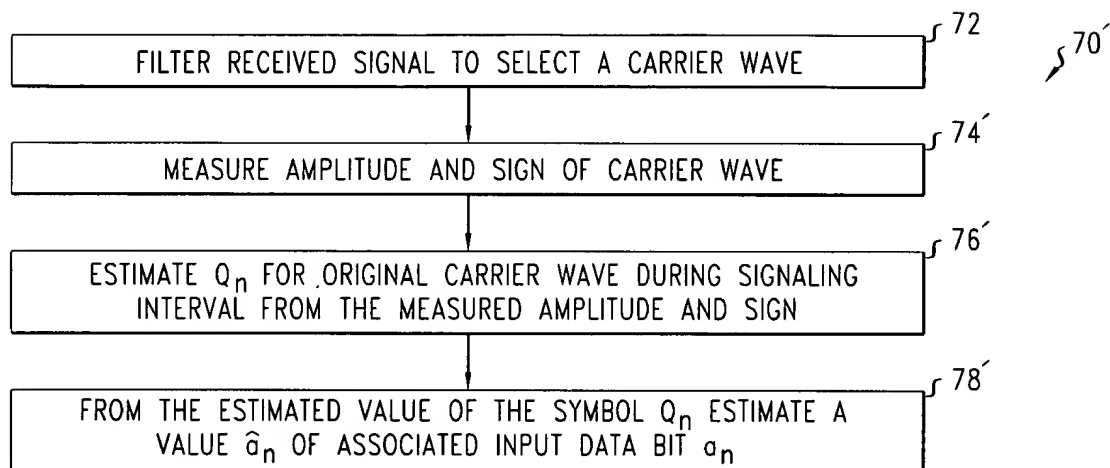FROM THE ESTIMATED VALUE OF THE SYMBOL Q_n ESTIMATE A VALUE $\hat{a}_n$ OF ASSOCIATED INPUT DATA BIT a_n $\quad$ 78'
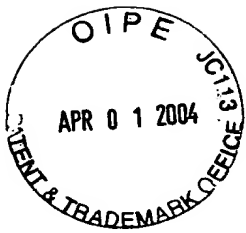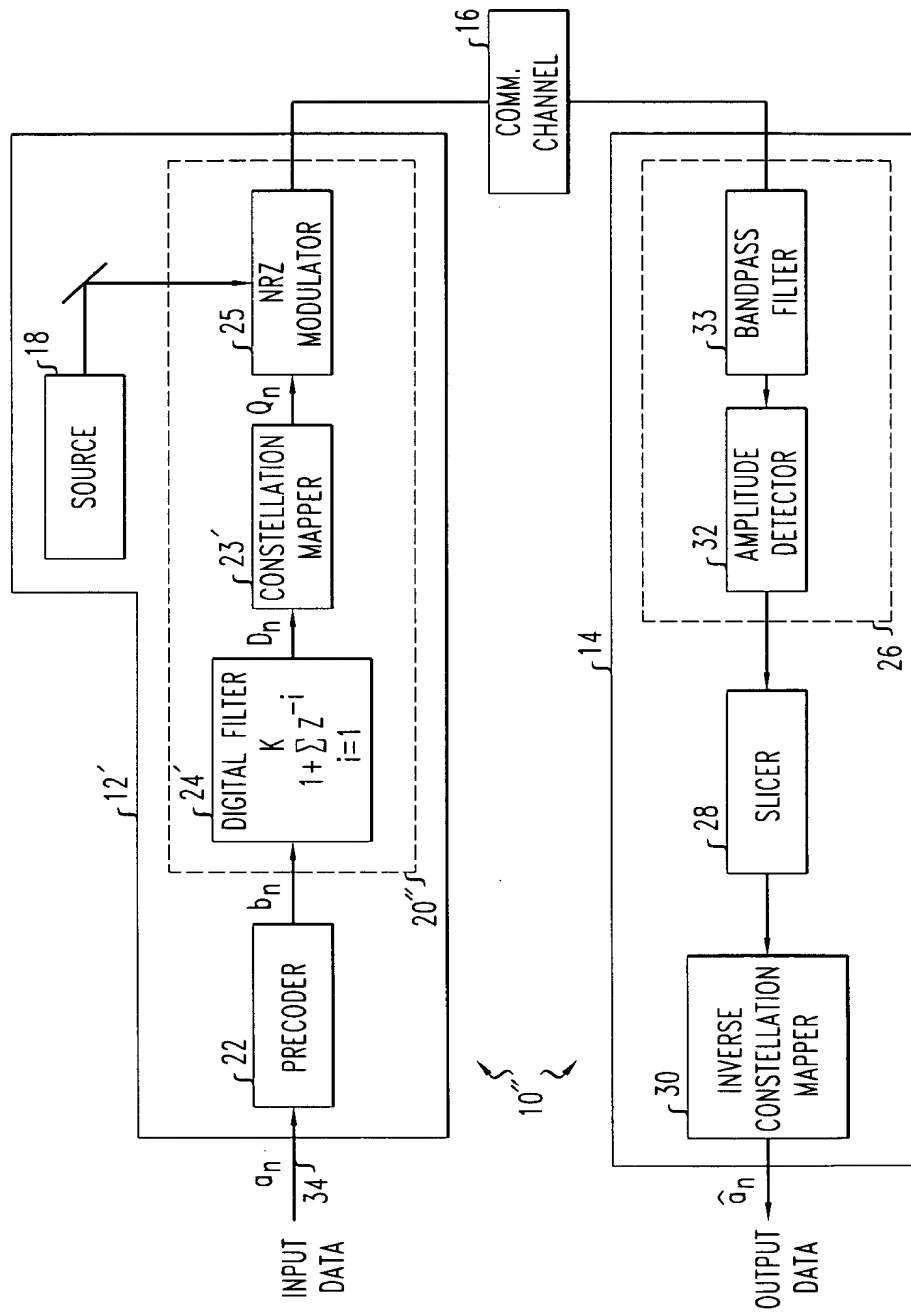
FIG. 8

FIG. 9

DIGITAL FILTER	NORMALIZED SIGNAL BANDWIDTH*	LOSS IN RECEIVER SENSITIVITY (dB)*	NUMBER OF TRANSMITTER SIGNAL AMPLITUDES Q_n	NUMBER OF RECEIVER SIGNAL AMPLITUDES Q_n^2
$1+\sum z^{-i}$ (DUOBINARY)	$\frac{1}{2}$	0	3	2
$1+z^{-1}+z^{-2}+z^{-3}$	$\frac{1}{4}$	3	5	3
$1+\sum_{i=1}^{5} z^{-i}$	$\frac{1}{6}$	4.8	7	4
$1+\sum_{i=1}^{7} z^{-i}$	$\frac{1}{8}$	6	9	5
. . .	. . .	. . .	. . .	. . .
$1+\sum_{i=1}^{15} z^{-i}$	$\frac{1}{16}$	9	17	9

*RELATIVE TO A BASELINE ON/OFF NRZ MODULATION